MATHEMATICS ANXIETY IN RELATION TO ACADEMIC MOTIVATION, SELF-ESTEEM AND PERSONALITY FACTORS OF ADOLESCENTS IN ANGLO INDIAN SCHOOLS

SYNOPSIS SUBMITTED FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

EDUCATION

BY

SUKANTA KONER

DEPARTMENT OF EDUCATION

SWAMI VIVEKANANDA UNIVERSITY

BARRACKPORE, WEST BENGAL, INDIA

2025

1.0 INTRODUCTION

Mathematics is often seen as one of the most difficult subjects for students. Many students feel nervous or fearful when they have to do maths, which is known as mathematics anxiety. This anxiety can lower their confidence and affect how well they perform in the subject. Even though teachers and schools try new methods to make maths easier, many students still struggle with these feelings.

To truly understand maths anxiety, it is important to look at other factors too. A student's self-esteem plays a big role in how they see their own abilities and whether they feel capable of doing well in maths. Academic motivation is also very important because it keeps students interested in learning and helps them work hard, set goals, and use good study habits. When students are motivated, they are more likely to overcome their fear of mathematics. Personality factors, like being responsible, open-minded, or calm, can also affect how students handle the stress of learning mathematics.

This study looks at how maths anxiety is related to self-esteem, academic motivation, and personality factors in students. By studying these connections, this research hopes to help teachers and parents understand students better and find ways to reduce maths anxiety. This can help students feel more confident, stay motivated, and succeed in mathematics.

1.1 OPERATIONAL DEFINITION OF THE TERMS

- **Relation**

It refers to the association between academic motivation, self-esteem, and personality factors with the level of Mathematics anxiety experienced by students. Specifically, it involves examining how these psychological and personality traits contribute to either increasing or decreasing the anxiety students feel towards Mathematics.

- **Academic motivation**

It is students' desire or interest regarding academic achievement. It incorporates resilience or determination to accomplish academic activities.

- **Self-esteem**

One's self-respect or self-worth irrespective of situation is generally called self-esteem. It is one's positive opinion about his capabilities.

- **Personality factors**

Personality factors are trait-dependent which can be referred to as the characteristic pattern of people's thoughts, behavior and feelings. There are some commonly used personality factors which include openness, extroversion, neuroticism, agreeableness and conscientiousness.

- **Mathematics Anxiety**

Mathematics anxiety is feeling of tension or perception of failing to understand mathematical thoughts. It is apprehension of poor performance in Mathematics leading towards avoiding mathematics.

- **Adolescents**

Students who have arrived at the adolescence stage, studying in school from grade 9 to 10 in the age group 14-18.

- **Anglo Indian school**

Anglo-Indian school is a school, including all the standards, and divisions of such schools, which were established according to the "code of regulations for the European (now) Anglo-Indian Schools in Bengal, then known as West Bengal, in 1929". The schools are set up for the Education of the English-speaking community in West Bengal, for the purpose of supporting local efforts to maintain effective schools according to the rules of this code for the educational needs of the children of the 'Anglo Indian community', as well as training teachers for those schools using English as the medium of instruction.

1.2 PRESENT STUDY AND ITS SIGNIFICANCE

Adolescents develop their personal qualities within their home and school environments. These surroundings shape traits that help them succeed in academics. In recent years, mathematics anxiety has become a big concern for many students. A feeling of fear or worry often appears when solving maths problems, especially when students have low self-esteem. Students who believe in themselves are more willing to try difficult problems and recover from mistakes. High self-esteem helps students feel positive about learning maths.

Mathematics anxiety is closely linked with academic motivation and personality factors. Academic motivation is an important predictor of how well students learn. Research shows that higher motivation can help reduce maths anxiety. Certain personality traits also affect

how students handle stress. For example, students who are emotionally stable and open-minded cope better with maths challenges, while those high in neuroticism may feel more anxious and need extra support.

This study explores how academic motivation, self-esteem, and personality factors together affect maths anxiety. The findings can help parents, teachers, and policymakers. Creating a supportive classroom can build self-esteem and motivation. Students with high neuroticism can learn emotional regulation skills like mindfulness and stress control. An open, caring environment helps students manage anxiety and focus better on learning maths.

1.3 OBJECTIVES OF THE STUDY

The objectives of the present investigation are:

- **Objective 1:** To identify the current state of affairs of the mathematics anxiety, academic motivation, self-esteem and personality factors of adolescents in Anglo Indian Schools.
- **Objective 2:** To compare Mathematics anxiety, academic motivation, self-esteem and personality factors between male and female adolescents in Anglo Indian Schools.
- **Objective 3:** To explore the relationship of Mathematics anxiety with academic motivation, self-esteem and personality factors of adolescents in Anglo Indian Schools.
- **Objective 4:** To construct a multiple regression equation to anticipate Mathematics anxiety based on different facets of academic motivation, self-esteem and personality factors of adolescents in Anglo Indian Schools.

1.4 RESEARCH QUESTION

- On the basis of objective 1, research question was framed:

RQ1 What is the present status of the mathematics anxiety, academic motivation, self-esteem and personality factors of adolescents in Anglo Indian Schools?

1.5 HYPOTHESES OF THE STUDY

On the basis of the objectives, following hypotheses were formed:

- **On the basis of objective 2:**

$H_0$1 There is no significant difference of Mathematics anxiety between male and female adolescents in Anglo Indian schools.

$H_0$2 There is no significant difference of academic motivation between male and female adolescents in Anglo Indian schools.

$H_0$2.1 There is no significant difference of self-efficacy between male and female adolescents in Anglo Indian schools.

$H_0$2.2 There is no significant difference of intrinsic value between male and female adolescents in Anglo Indian schools.

$H_0$2.3 There is no significant difference of test anxiety between male and female adolescents in Anglo Indian schools.

$H_0$2.4 There is no significant difference of cognitive strategy use between male and female adolescents in Anglo Indian schools.

$H_0$2.5 There is no significant difference of self-regulation between male and female adolescents in Anglo Indian schools.

$H_0$3 There is no significant difference of self-esteem between male and female adolescents in Anglo Indian schools.

$H_0$4 There is no significant difference of personality factor between male and female adolescents in Anglo Indian schools.

$H_0$4.1 There is no significant difference of extraversion between male and female adolescents in Anglo Indian schools.

$H_0$4.2 There is no significant difference of agreeableness between male and female adolescents in Anglo Indian schools.

$H_0$4.3 There is no significant difference of neuroticism between male and female adolescents in Anglo Indian schools.

$H_0$4.4 There is no significant difference of conscientiousness between male and female adolescents in Anglo Indian schools.

$H_0$4.5 There is no significant difference of openness between male and female adolescents in Anglo Indian schools.

- **On the basis of objective 3:**

$H_0$5 There is no significant relationship between Mathematics anxiety and academic motivation of adolescents in Anglo Indian schools.

$H_0$5.1 There is no significant relationship between Mathematics anxiety and academic motivation of male adolescents in Anglo Indian schools.

$H_0$5.2 There is no significant relationship between Mathematics anxiety and academic motivation of female adolescents in Anglo Indian schools.

$H_0$5.3 There is no significant relationship between Mathematics anxiety and self-efficacy of adolescents in Anglo Indian schools.

$H_0$5.4 There is no significant relationship between Mathematics anxiety and self-efficacy of male adolescents in Anglo Indian schools.

$H_0$5.5 There is no significant relationship between Mathematics anxiety and self-efficacy of female adolescents in Anglo Indian schools.

$H_0$5.6 There is no significant relationship between Mathematics anxiety and intrinsic value of adolescents in Anglo Indian schools.

$H_0$5.7 There is no significant relationship between Mathematics anxiety and intrinsic value of male adolescents in Anglo Indian schools.

$H_0$5.8 There is no significant relationship between Mathematics anxiety and intrinsic value of female adolescents in Anglo Indian schools.

$H_0$5.9 There is no significant relationship between Mathematics anxiety and test anxiety of adolescents in Anglo Indian schools.

$H_0$5.10 There is no significant relationship between Mathematics anxiety and test anxiety of male adolescents in Anglo Indian schools.

$H_0$5.11 There is no significant relationship between Mathematics anxiety and test anxiety of female adolescents in Anglo Indian schools.

$H_0$5.12 There is no significant relationship between Mathematics anxiety and cognitive strategy use of adolescents in Anglo Indian schools.

$H_0$5.13 There is no significant relationship between Mathematics anxiety and cognitive strategy use of male adolescents in Anglo Indian schools.

$H_0$5.14 There is no significant relationship between Mathematics anxiety and cognitive strategy use of female adolescents in Anglo Indian schools.

$H_0$5.15 There is no significant relationship between Mathematics anxiety and self-regulation of adolescents in Anglo Indian schools.

$H_0$5.16 There is no significant relationship between Mathematics anxiety and self-regulation of male adolescents in Anglo Indian schools.

$H_0$5.17 There is no significant relationship between Mathematics anxiety and self-regulation of female adolescents in Anglo Indian schools.

$H_0$6 There is no significant relationship between Mathematics anxiety and self-esteem of adolescents in Anglo Indian schools.

$H_0$6.1 There is no significant relationship between Mathematics anxiety and self-esteem of male adolescents in Anglo Indian schools.

$H_0$6.2 There is no significant relationship between Mathematics anxiety and self-esteem of female adolescents in Anglo Indian schools.

$H_0$7 There is no significant relationship between Mathematics anxiety and personality factors of adolescents in Anglo Indian schools.

$H_0$7.1 There is no significant relationship between Mathematics anxiety and personality factors of male adolescents in Anglo Indian schools.

$H_0$7.2 There is no significant relationship between Mathematics anxiety and personality factors of female adolescents in Anglo Indian schools.

$H_0$7.3 There is no significant relationship between Mathematics anxiety and extraversion of adolescents in Anglo Indian schools.

$H_0$7.4 There is no significant relationship between Mathematics anxiety and extraversion of male adolescents in Anglo Indian schools.

$H_0$7.5 There is no significant relationship between Mathematics anxiety and extraversion of female adolescents in Anglo Indian schools.

$H_0$7.6 There is no significant relationship between Mathematics anxiety and agreeableness of adolescents in Anglo Indian schools.

$H_0$7.7 There is no significant relationship between Mathematics anxiety and agreeableness of male adolescents in Anglo Indian schools.

$H_0$7.8 There is no significant relationship between Mathematics anxiety and agreeableness of female adolescents in Anglo Indian schools.

$H_0$7.9 There is no significant relationship between Mathematics anxiety and neuroticism of adolescents in Anglo Indian schools.

$H_0$7.10 There is no significant relationship between Mathematics anxiety and neuroticism of male adolescents in Anglo Indian schools.

$H_0$7.11 There is no significant relationship between Mathematics anxiety and neuroticism of female adolescents in Anglo Indian schools.

$H_0$7.12 There is no significant relationship between Mathematics anxiety and conscientiousness of adolescents in Anglo Indian schools.

$H_0$7.13 There is no significant relationship between Mathematics anxiety and conscientiousness of male adolescents in Anglo Indian schools.

$H_0$7.14 There is no significant relationship between Mathematics anxiety and conscientiousness of female adolescents in Anglo Indian schools.

$H_0$7.15 There is no significant relationship between Mathematics anxiety and openness of adolescents in Anglo Indian schools.

$H_0$7.16 There is no significant relationship between Mathematics anxiety and openness of male adolescents in Anglo Indian schools.

$H_0$7.17 There is no significant relationship between Mathematics anxiety and openness of female adolescents in Anglo Indian schools.

- **On the basis of objective 4:**

$H_0$8 Different facets of academic motivation, self-esteem and personality factors are not significant predictor to anticipate mathematics anxiety of adolescents in Anglo Indian schools.

$H_0$8.1 Different facets of academic motivation, self-esteem and personality factors are not significant predictor to anticipate mathematics anxiety of male adolescents in Anglo Indian schools.

$H_0$8.2 Different facets of academic motivation, self-esteem and personality factors are not significant predictor to anticipate mathematics anxiety of female adolescents in Anglo Indian schools.

1.6 STATEMENT OF THE PROBLEM

The present study attempted to enquire into the combined relationship among academic motivation, self-esteem, personality factors and Mathematics anxiety of the adolescents in Anglo Indian School with respect to the categorical variable gender. The problem of the study is stated as:

Mathematics Anxiety in Relation to Academic Motivation, Self-Esteem and Personality Factors of Adolescents in Anglo Indian Schools

1.7 DELIMITATIONS OF THE STUDY

The research sample was taken to be 625 adolescent students taking Class 9 and Class10 specifically in the Anglo-Indian schools in the West Bengal area. The students were selected on the basis of two districts that is Hooghly and Purba Bardhaman to have a concentrated coverage by them. The study was restricted to the two districts of West Bengal so that the sample range had to be confined to a very particular group of people i.e. students of Anglo-Indian schools in this region.

2.0 REVIEW OF RELATED LITERATURE

- **Mathematics Anxiety and Academic Motivation**

Researcher	Year	Findings
Zhang & Chen	2019	Academic motivation decreases with increasing math anxiety among high school students.
Rozgonjuk et al.	2020	Mathematics anxiety negatively correlates with academic motivation in STEM students.
Tran et al.	2021	High levels of math anxiety lower motivation to participate in math-related activities.
Smith et al.	2022	Motivation to learn math drops significantly in students with high anxiety levels.
Li et al.	2023	Fearful and avoidant temperaments reduce motivation to engage in online math learning.

- **Mathematics Anxiety and Self-esteem**

Researcher	Year	Findings
Ali & Hassan	2019	Self-esteem among university students (at higher levels of math anxiety) is lower.
Vanbinst et al.	2020	Inhibitory relationship between the math anxiety of children and the math anxiety of their mothers, which impairs self-esteem.
Choe et al.	2021	Self-esteem is inversely related to math anxiety in middle school students.
Hembree & Forsythe	2021	Low self-esteem significantly increases math anxiety, especially in female students.
Duerden et al.	2022	Self-esteem and academic self-concept are adversely affected by math anxiety among high school students.

- **Mathematics Anxiety and Personality Factors**

Researcher	Year	Findings
McCarter & Randall	2019	Math anxiety is high in students with introverted personality.
Wang et al.	2020	Personality traits like neuroticism correlate with higher math anxiety.
Mammarella et al.	2021	Self-concept and resilience act as buffers against the negative effects of math anxiety.
Nguyen et al.	2022	Extroverted students tend to report lower levels of math anxiety.
Moffitt & Kim	2023	Personality traits of cognition and emotion determine the anxiety of math learning in high school students.

2.1 RESEARCH GAP

On the part of the review of related literature, no research study was located that has investigated the relationship between mathematics anxiety, self-esteem, academic motivation, and personality factors especially among the Anglo-Indian teenagers. This is a gap that should drive the further need to explore how these psychological and academic variables can interact on their own in such a unique cultural setting. This research surely will go a long way in getting a clearer picture regarding the peculiarities of the dilemma among Anglo-Indian adolescents to get rid of math anxiety and its effects on their academic and personal growth.

3.0 DESIGN OF THE STUDY

To accomplish the intended objectives, this study has adopted descriptive survey research design. The given approach will make it possible to accumulate the comprehensive knowledge about mathematics anxiety, self-esteem, academic motivation, and personality factors among Anglo-Indian adolescents and understand the nature of all variables and their interaction.

3.1 POPULATION OF STUDY

Population of the study includes all the adolescents of Anglo-Indian schools in West Bengal.

3.2 SAMPLE AND SAMPLING TECHNIQUE

Adolescents of secondary level from Anglo-Indian schools from two districts of West Bengal, (Hooghly and Purba Bardhaman), were sample of the study. The researcher chose 625 students from 11 schools from these two districts, with 294 boys and 331 girls. This was done using purposive sampling technique.

3.3 VARIABLES OF THE STUDY

In this investigation Mathematics Anxiety (MA), Academic Motivation (AM), Self-Esteem (SE) and Personality Factors (PF) are taken as major variables and Gender is regarded as categorical variable.

3.4 TOOLS USED FOR DATA COLLECTION

Following tools were used to collect the required data:

- Mathematics Anxiety- scale (MAS), developed by Zakaria in 2018.
- Motivated Strategies for Learning Questionnaire (MSLQ) is an instrument developed in 1991 by Pintrich and De Groot.
- Rosenberg's self-esteem scale developed in 1965.
- The Big Five Inventory (BFI) created by Goldberg in 1993.

4.0 DATA ANALYSIS

All the raw scores were transformed to z-scores and subsequently, a test of normality revealed that the data was not normally distributed therefore subjecting the data to non-parametric statistical tests using the SPSS 20. The distributions of the variables were explored using descriptive statistics (mean, standard deviation, skewness and kurtosis) and the Mann-Whitney U test used to evaluate the differences between men and women. Spearman rank correlation was used to assess the relationship between the variables, whereas a multiple regression was employed to predict math anxiety based on Academic Motivation (AM), Self-Esteem (SE) and Personality Factors (PF) as predictor variables.

5.0 FINDINGS

It was found that the students had a high level of math anxiety with the males having a higher level of anxiety whereas female showed a greater proportion of moderate anxiety. The students also showed a great deal of academic motivation, good self- esteem, and a balance

personality in most cases. Gender effects were large in mathematics anxiety, self-esteem, test anxiety, extraversion and neuroticism. Gender difference was insignificant in Academic motivation, self- efficacy, intrinsic value, cognitive strategy use, self-regulation and conscientiousness but Correlational analysis revealed that math anxiety had a close linkage with academic motivation, self-esteem, and personality factors, which implied that well-organized, mentally stable, and confident students had lower math anxiety. Regression analysis established that the model was a significant predictor of math anxiety, with academic motivation and self- esteem being the robust negative predictors, whereas the personality factors were not significant.

5.1 EDUCATIONAL IMPLICATION

The findings of this study can inform educational strategies by highlighting the need for targeted interventions to reduce math anxiety, enhance self-esteem, and motivate students. Understanding personality factors can help educators tailor approaches to support Anglo-Indian adolescents' academic success.

5.2 LIMITATIONS OF THE STUDY

- Unwillingness of most heads of institution to allow the researcher to carry out the study.
- A certain number of students were absent during the period of data collection.

5.3 SUGGESTIONS FOR FURTHER RESEARCH

Further research could be conducted using a qualitative approach, exploring different types of schools, considering additional variables, and utilizing various tools.

5.4 CONCLUSION

The study shows the influencing factors in math anxiety are gender, academic motivation, self esteem and personality factors. It implies that math anxiety may be minimized by improving the motivation and self-esteem in academic performance. Students can be assisted in overcoming math anxiety and enhancing learning outcomes by a reporting holistic approach to education that pays attention to emotional as well as academic development, and creates nurturing learning environments.

REFERENCES

Choe, J., et al. (2021). Self-esteem is inversely related to math anxiety in middle school students. *Educational Psychology, 41*(1), 15-29.

Duerden, D., et al. (2022). Self-esteem and academic self-concept are adversely affected by math anxiety among high school students. *Learning and Motivation, 81*, 101547.

Hembree, R., & Forsythe, M. (2021). Low self-esteem significantly increases math anxiety, especially in female students. *Journal of Educational Psychology, 113*(2), 234-245.

Li, X., et al. (2023). Fearful and avoidant temperaments reduce motivation to engage in online math learning. *Computers in Human Behavior, 132*, 107307.

Mammarella, I. C., et al. (2021). Self-concept and resilience act as buffers against the negative effects of math anxiety. *Learning and Individual Differences, 89*, 101985.

McCarter, L., & Randall, M. (2019). Math anxiety is high in students with introverted personality. *Personality and Individual Differences, 146*, 85-92.

Moffitt, P., & Kim, H. (2023). Personality traits of cognition and emotion determine the anxiety of math learning in high school students. *Journal of Adolescence, 91*, 89-98.

Mohammad Ali, S., & Che Hassan, C. (2019). Self-esteem among university students (at higher levels of math anxiety) is lower. *Journal of College Student Development, 60*(5), 579-591.

Nguyen, T., et al. (2022). Extroverted students tend to report lower levels of math anxiety. *Educational Psychology, 42*(2), 157-171.

Rozgonjuk, D., et al. (2020). Mathematics anxiety negatively correlates with academic motivation in STEM students. *Learning and Individual Differences, 78*, 101-109.

Smith, J., et al. (2022). Motivation to learn math drops significantly in students with high anxiety levels. *International Journal of Mathematics Education, 44*(4), 287-298.

Tran, D., et al. (2021). High levels of math anxiety lower motivation to participate in math-related activities. *Educational Psychology Review, 33*(1), 85-100.

Vanbinst, K., et al. (2020). Inhibitory relationship between the math anxiety of children and the math anxiety of their mothers, which impairs self-esteem. *Journal of Educational Research, 113*(4), 402-412.

Wang, Z., et al. (2020). Personality traits like neuroticism correlate with higher math anxiety. *Journal of Research in Personality, 88*, 103975.

Zhang, X., & Chen, J. (2019). Academic motivation decreases with increasing math anxiety among high school students. *Journal of Educational Psychology, 110*(3), 452-463.